# DIAGNOSING FAULTS USING A RAKSTAR

The RAKStar unit allows keypads to be cabled individually back to a central point rather than running the data network as a daisy chain arrangement. As well as allowing a star wiring arrangement the RAKStar can be extremely useful in diagnosing cabling issues if the user is familiar with its operation. Cabling issues are by far the most common problem with wired systems and can be the most time-consuming to correct. A Rako wired network should work faultlessly and any intermittent problems or delays in uploading information to Rako devices are all symptoms of wiring faults.

To facilitate easy diagnosis the RAKStar has switches that isolate the data to each leg and header connectors which isolate the low voltage power.

BASIC PRINCIPLE.

The RAKStar forms a daisy chain network for the Rako wired system out of home run or star wiring. It does so by using the green-green/white pair of the CAT5 cable as a return for the data back to the RAKStar. A simplified diagram (1) of the data wiring switching can be seen below.
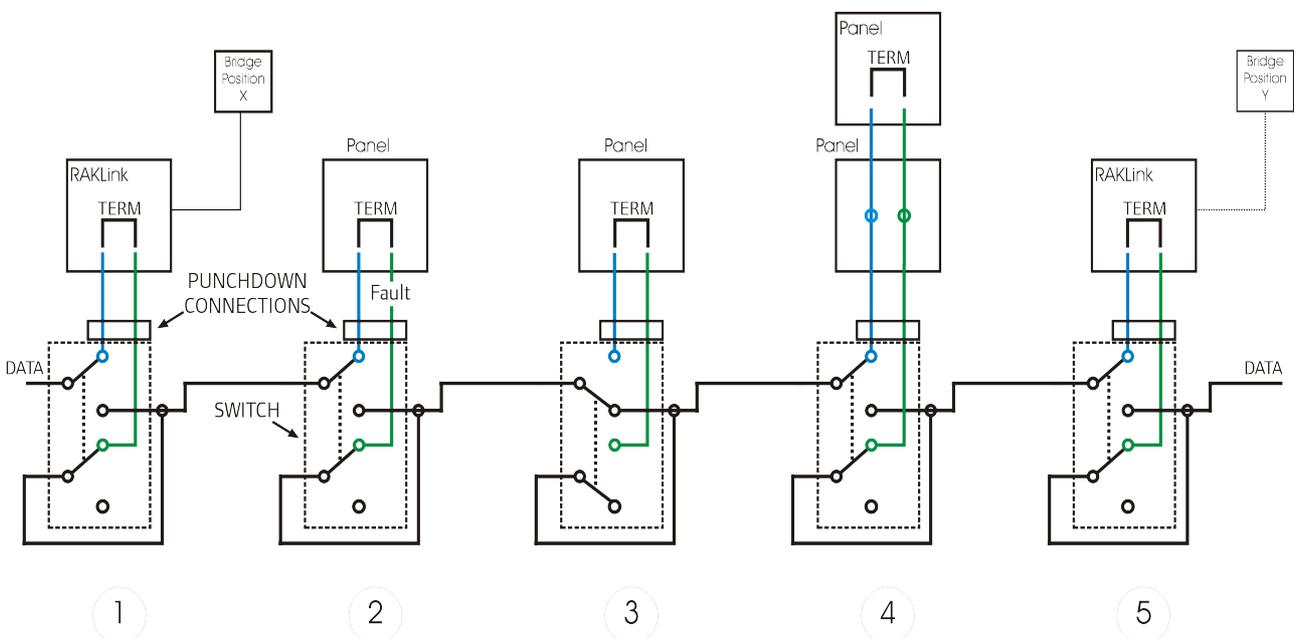
Simplified Diagram (1) Showing Blue and Green Data Line Only

Note: Simplified diagram shows Blue and Green data pair. In reality the switch is 4 pole and the switching is repeated for the Blue/White and Green/White pairs.

DATA

Using the switches and header connectors associated with each punch-down connection, each leg can be isolated from the data and power respectively. The ability to isolate legs is a powerful diagnostic tool when trying to troubleshoot network problems.

Each leg has a black switch near the associated punch-down connector. With the switch in the up position data is sent out on that leg. With the switch in the down position that leg is bypassed and the data connection passes directly to the next leg. A switch in the up position where there is no device connected will _break_ the data line.

IMPORTANCE OF CORRECT TERMINATION

From the simplified diagram (1) it can be seen that if a user connects to a Rako Bridge at position X the data route to panel 4 is down the Green pair of 1, out on the Blue of 2, back on Green pair, 3 is bypassed with the switch in the DOWN position and out on Blue to panels 4. It can be seen that if panel 2 does not have the Star terminations in place the data stops at panel 2 and goes no further. From the same diagram (1) it can be seen that of the two panels connected to 4 the first must NOT be terminated but the last panel needs to be Star terminated. The rule is that the last device on any leg must be Star terminated. The RAKStar has an internal end of line termination.

IDENTIFYING DATA FAULT LOCATION

From the simplified diagram (1), if there was a fault on the Green return pair of panel 2 it can be seen that no data will get to panels 3 or higher. At this point the fault could either be with the Green return of 2 OR the Blue of 4. If the data switch of 2 is put into the Down position isolating that panel and communication is now possible with panel 4 then the Blue of 4 is proved to be good and the fault must be with the Green of 2. Equally if there is still no communication with 4 then the fault is certainly with the Blue of 4. This can further proved by switching 2 back on switching 4 off and trying communication with the RAKLink of 5.

NOTE

It can be seen that when investigating a fault on panels 1-5 from Bridge position Y that the data flow is reversed, i.e. data is sent out to the panels on the Green pair and returns to the RAKStar on the Blue pair.

BRIDGE NETWORK STATUS FEEDBACK.

The embedded web page in the Bridge (as accessed when configuring the Bridge) gives a network bus status message depending on the number of failed message transmits and receives. The following messages are the most common

Bus: Active – indicates a good network
Bus: Active Tx Warn – indicates some degree of intermittency.
Bus: Passive Tx – indicates a high degree of intermittency.

All messages other than 'Active' should prompt further investigation.

RULES FOR MULTIPLE RAKSTARS

With reference to the simplified diagram (1) it can be seen that if another RAKStar were to be connected to the first RAKStar in any position other than on the first or last punch-down connections (1 or 18) the network would continue along the second RAKStar and have no return path to the first. The rule is that two RAKStars should be connected using the first or last punch-downs only.

POWER

The header connector associated with each punch-down determines whether 15V DC power is sent out to that leg with power being sent if the header connector is fitted (see Power Diagram (3)). The single red LED on the circuit board indicates whether 15V DC power is present on the RAKStar.

In the event that there is a short circuit on the power cores of the data cable (see core voltage table below) the most likely result is that the resettable fuse in the RAKLink will trip and the power LED will extinguish on the RAKStar. The header connectors are then useful to isolate the power from individual legs until the leg with a fault can be determined. Note that after tripping the internal fuse power to the RAKLink will need to be cycled before the fuse will re-set.

Diagram (2)
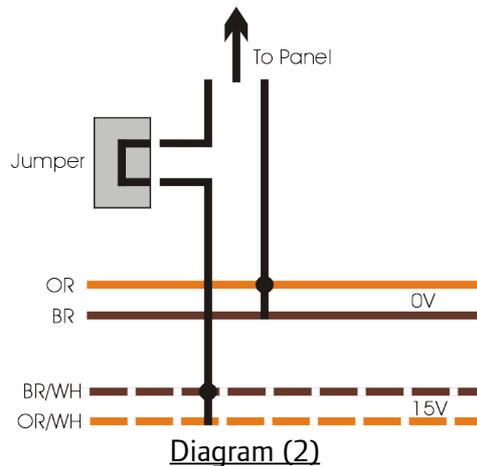
CORE VOLTAGE TABLE

Core colour	Function	Typical voltage
Green/White	Data + (return)	2.5-3V
Green	Data - (return)	2.5-3V
Brown	Power -	0V
Brown/White	Power +	15V
Blue/White	Data +	2.5-3V
Blue	Data -	2.5-3V
Orange	Power -	0V
Orange/White	Power +	15V

NOTES ON VOLTAGES

The Rako wired network will stop working when the power voltage drops below approximately 10V. The data voltages should be measured relative to the GND pin on the 2 way aux power terminal.